UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/566,157	01/27/2006	Shigeo Shibatani	10089/28	9830

23838 7590 09/09/2008

KENYON & KENYON LLP
1500 K STREET N.W.
SUITE 700
WASHINGTON, DC 20005

EXAMINER	
PAGE, BRENT T	

ART UNIT	PAPER NUMBER
1638	

MAIL DATE	DELIVERY MODE
09/09/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/566,157	SHIBATANI ET AL.	
	Examiner	Art Unit	
	BRENT PAGE	1638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 February 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *20-32* is/are pending in the application.

4a) Of the above claim(s) *20 and 21* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *22-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 02/06/2008 has been entered.

Claim Rejections - 35 USC § 112

The rejection of the claims under 35 USC 112 first paragraph for both enablement and written description is hereby withdrawn in response to the claim amendments.

Claim Rejections - 35 USC § 103

To more clearly communicate the state of the art, particularly as it applies to the instant invention and to address Applicants arguments more clearly, the following rejection of the claims under 35 USC 103(a) is made to replace the 103 rejection made in previous office actions. The arguments submitted by Applicant will be addressed in light of the following rejection.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 22-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weigel et al (US Patent 6991921, filed 12/11/2001) in view of Sohn et al (US Patent 6444805), further in view of Fischer et al (2000 Transgenic Research 9:279-299) and further, in light of Xia (US Patent 6395965).

The claims are drawn to a method of producing hyaluronic acid comprising transforming a plant with a DNA encoding hylauronic acid synthase derived from a chlorella virus and separating the hyaluronic acid from the plant, wherein the vector used in the method further comprises an organ specific or tissue specific promoter and a transformed plant, progeny or organ therefrom.

Weigel et al teach the production of hyaluronic acid using a recombinant construct comprising a chlorella virus-derived hyaluronic acid synthase and transforming a streptococcal bacterium and isolating the hyaluronic acid from the bacterium (see claims and Figure 12 for example). Weigel et al also teach the infection and thus transformation of chlorella cells with PBCV-1 comprising the hyaluronic acid synthase gene and the isolation of hyaluronic acid with using a binding protein (see paragraphs 28-32 of the detailed description of the invention, for example).

Weigel et al do not teach the transformation of plants using recombinant expression vector or the said construct further comprising a tissue or organ specific promoter.

Sohn et al teach the production of HPV vaccine by transforming a plant with a recombinant vector expressing the HPV capsid protein, a transgenic plant produced

therefrom and the isolation of the vaccine from the plant (see claims and Examples 1-3, for example).

Fischer et al teach the benefit of producing foreign proteins in plants. Fischer et al state "Plant expression systems are attractive because they offer significant advantages over the classical expression systems based on bacterial, microbial and animal cells (Table 1). Firstly, they have a higher eukaryote protein synthesis pathway, very similar to animal cells with only minor differences in protein glycosylation", Fischer et al also state "Contrastingly, bacteria cannot produce full size antibodies nor perform most of the important mammalian post-translational modifications" (see page 281 last paragraph). Fischer et al also disclose the cost and contamination benefits of plants (see pages 281 and 282, for example).

Xia teaches the transformation of plants with vectors comprising Chlorella promoters and the function therein (see claims).

The gene and recombinant construct of the instant invention are disclosed by Weigel et al. The use of plants to produce high quantities of recombinant protein are common in the art and shown and suggest by Fischer et al and typified by Sohn et al. The disclosure of Xia shows that Chlorella virus sequences have been transformed into plants and the function has not been altered and so a reasonable expectation of success in transforming plants with Chlorella virus DNA exists.

Given the state of the art and the disclosures by Weigel et al, Fischer et al, Sohn et al, and Xia, it would have been obvious to one of ordinary skill in the art to transform plants as suggested and taught by Fischer et al with the recombinant construct taught

by Weigel et al to produce hyaluronic acid in plants. The clear advantage of using plants to microbial systems is taught and suggested by Fischer et al and the need for isolation of hylarunic acid and the motivation for isolating it is provided by Weigel et al. The tissue specific promoters of the instant invention are well known in the art and represent design choices that would have been readily appreciated by one of ordinary skill in the art.

Response to Arguments

Applicant's arguments filed 02/06/2008 have been fully considered but they are not persuasive.

Applicants urge that neither Akasaka nor Mattes et al suggest the use of plants to produce hyaluronic acid (pages 2-3 of response).

This is not persuasive because both Akasaka and Mattes et al disclose disadvantages of using microbial systems and in do doing, steer one towards the use of plant for producing hyaluronic acid. However, to clarify the advantages of plants that one of ordinary skill in the art would have appreciated at the time of filing, Fischer et al has been cited.

Applicants urge that Smeekens et al either alone or in combination does not provide a motivation to transform a plant cell to produce a carbohydrate other than oligosaccharides (pages 3-4 of response).

This is not persuasive because Smeekens et al demonstrates the predictability of utilizing plants to produce polysaccharides and thus demonstrate a reasonable expectation of success. However, to clarify, Smeekens et al has been replaced with

Sohn et al to more clearly demonstrate that the transformation of plants with recombinant proteins from other organisms for high scale production was well known in the art at the time of filing. Furthermore, the citation of Fisher et al provides the motivation as well as the expectation of success. Absent evidence to the contrary, there is no reason one of ordinary skill in the art would have questioned the successful expression of recombinant hyaluronic acid synthase in plants.

Applicants urge that a reasonable expectation of success was not present because of the limited supply of sugar precursors in plants and that therefore the instant invention is a surprising result.

This is not persuasive because the cited art does not in any way indicate that hyaluronic acid would not be produced in plant cells, nor does the instant invention require that the plants producing the hyaluronic acid be otherwise perfectly healthy. On the contrary, once the hyalurnic acid is produced the effects upon plant growth are of no concern. The suggestion that GlcA and GlcAc "may" be depleted and no longer available for cell wall synthesis is insufficient evidence that success of the instant invention would not have been expected by one of ordinary skill in the art.

No claims are free of the prior art.

No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRENT PAGE whose telephone number is (571)272-5914. The examiner can normally be reached on Monday-Friday 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anne Marie Grunberg can be reached on (571)-272-0975. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Brent T Page

/Anne Marie Grunberg/

Supervisory Patent Examiner, Art Unit 1638